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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/716,838	11/18/2003	Hai Xiong Ruan	60937-0147	7048

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EXAMINER

SELLMAN, CACHET I

ART UNIT	PAPER NUMBER
1762	

DATE MAILED: 05/12/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/716,838	Applicant(s) RUAN ET AL.	
	Examiner Cachet I. Sellman	Art Unit 1762	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 November 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-30 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 November 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>4/12/2006</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities:
 - In the Brief Description of the Drawings section the applicant is missing Fig. 7.Appropriate correction is required.

Drawings

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: In Fig. 3, reference character "3A" is not in the specification. Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Information Disclosure Statement

3. The Information Disclosure Statement filed on 4/12/2006 was considered. However the serial numbers for patent applications were crossed out on the IDS because they should be listed under Non-Patent Literature.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yonezawa et al. in view of Hill et al. (US 5534312).

Yonezawa et al. discloses a process for forming silver metal films by photolysis of silver salts of high molecular weight carboxylic acids. The method forms the film at room temperature in a wet air using a low intensity UV light. The silver metal film can be used for circuit pattern formation and imaging materials.

Yonezawa et al. does not disclose depositing an amorphous film and irradiating the amorphous film to produce elemental silver as required by **claim 1**.

Hill et al. discloses a process for forming patterned metal films using a photoresist free method. The method comprises applying an amorphous film of a metal

Art Unit: 1762

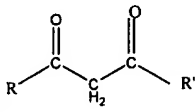
complex to a substrate then exposing the film to electromagnetic radiation to form into a metal containing material attached to the substrate (column 2, lines 46-55). The metal patterned film can be applied to integrated circuits VLSI devices, and semi-custom chips (column 1, lines 6-14). Hill et al. further discloses that the process can be used with metal complexes of a transition metal.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Yonezawa et al. to include the process of Hill et al. in order to form a patterned silver film for circuits. One would have been motivated to do so because Yonezawa et al. discloses that the silver film can be used in circuit pattern formation and imaging materials and Hill et al. teaches a process for forming patterned films for circuits without the use of photoresist, and that the method can be used for transition metals and both disclose the use of UV light to form the metal film. Hill et al. further teaches that this method does not have the disadvantage of methods that use photoresists such as a multi stage masking process or lost of resolution therefore one would have a reasonable expectation of success in forming the silver film.

The film can be a conductive film as well as a semiconductor film (column 4, line 28) as required by **claims 2 and 4**. Hill et al. teaches that the irradiated film comprises metal oxide (column 2, lines 56-58) as required by **claim 3**. The film is irradiated with electromagnetic radiation (column 2, lines 51-52) as required by **claim 5**. Hill discloses that the film can be irradiated using ultraviolet light, laser light, visible light, ion beam, or electron beam (column 3, lines 4-5, column 5, lines 11, column 12, lines 15-22) as

Art Unit: 1762

required by **claims 6-7, and 10-12**. Hill teaches that a thermal reaction occurs in the film (column 5, lines 38-40) as required by **claim 8**. The irradiating comprises photolysis (column 2, line 53) as required by **claim 9**. Hill et al. discloses that the silver oxide is reduced after irradiating by reacting with a suitable chemical in a suitable atmosphere (column 2, lines 60-62) as required by **claim 13**. The method is done in a controlled atmosphere, which can comprise an inert gas, air, a gas containing a reactive element or compound or vacuum (column 6, lines 33-36) as required by **claims 14- 17**. In regards to **claim 18**, since the atmosphere contains air and there is no indication that the air is dry, it would be obvious that the atmosphere would contain water because air contains a small amount of water vapor. Hill et al. discloses that it is known in the art to remove the unexposed portions of the film through etching (column 1, lines 43-44) as required by **claims 19 and 30**. Hill et al. discloses that the metal containing precursor

comprises a metal complexed with at least one ligand comprising  where Rand R' are selected from C_nH_m and $C_nH_mA_xB_y$ (column 3, lines 24-37) as required by **claim 20**. Hill et al. does not specifically teach the use of hexafluoroacetate tetraglyme, trifluoroacetylacetonate, hexafluoroacetylacetonate or acetylacetonate as required by **claims 21-24 and 27**. However Hill et al. discloses that the ligand must be chosen to make the photochemical steps in the process efficient and that the intermediate product produced is unstable and spontaneously converts to the desired new material and volatile byproducts (column 7, lines 38-67 and column 8, lines 1-67 and column 9, lines 1-13) therefore the ligand is a result effective variable. It would have been obvious to

Art Unit: 1762

one having ordinary skill in the art at the time the invention was made to include the precursors in the claims through routine experimentation in order to make the photochemical process efficient especially absent any criticality in using the claimed precursors.

Hill et al. teaches covering the film with a mask that leaves a patterned exposed area (Fig. 2B) as required by **claim 25**. As stated above Hill teaches depositing an amorphous film onto a substrate and irradiating the film using a patterning means to produce a patterned irradiated film (Fig. 3 and column 4, lines 18-20 and 61-67) as required by **claim 26**. Hill et al. teaches heating the unirradiated complex to convert it to a film comprising silver oxide (column 5, lines 60-65) as required by **claim 28**. The silver oxide film is heated in an atmosphere comprising hydrogen (column 29, Example 1, and column 9, lines 36-41) as required by **claim 29**.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Cachet I. Sellman whose telephone number is 571-272-0691. The examiner can normally be reached on Monday through Friday, 7:00 - 4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on 571-272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1762

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Cachet Sellman
Patent Examiner
AU 1762



TIMOTHY MEEKS
SUPERVISORY PATENT EXAMINER